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**DRAFT Project Instructions**

**Date Submitted:** TBD

**Platform:** NOAA Ship *Okeanos Explorer*

**Project Number:** EX-15-04 Leg IV

**Project Title:** *Campaign to Address Pacific monument Science, Technology, and Ocean NEeds (CAPSTONE) Leg IV*

**Project Dates:** September 7, 2015 – September 30, 2015

Prepared by: Brian Kennedy, NOAA

 Expedition Coordinator

 Office of Ocean Exploration & Research

Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dated: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 John McDonough

 Deputy Director

 Office of Ocean Exploration & Research

 Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dated: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Captain Anne K. Lynch, NOAA

 Commanding Officer

 Marine Operations Center - Atlantic

1. **OVERVIEW**

**A. Brief Summary and Project Period**

From July to September 2015, NOAA Ship *Okeanos Explorer* will conduct four telepresence-enabled ocean exploration cruises as part of the “Hohonu Moana: Exploring the Deep Waters off Hawai’i” Expedition to collect critical baseline information to meet NOAA science and management needs within the Hawaiian Archipelago and Johnston Atoll. The expedition is the first in a three-year Campaign of Expeditions (Campaign to Address Pacific monument Science, Technology, and Ocean NEeds or CAPSTONE) focused on exploring deepwater marine protected areas in the Pacific, serves as an opportunity for NOAA and the Nation to highlight the uniqueness and importance of the Pacific Monuments and Sanctuaries, which are national symbols of ocean conservation. Operations conducted during this campaign support NOAA missions to understand and predict changes in climate, weather, oceans and coasts, and share that knowledge and information with others. Much of this year’s work will contribute to and complement Deep Sea Coral Research and Technology Program’s three-year Pacific Islands Regional Initiative.

This document contains project instructions for EX-15-04 Leg IV, the last ROV cruise of the 2015 CAPSTONE effort. Operations for this cruise will include ROV, mapping, CTD rosette and telepresence-based remote participation. The expedition will be staged in and out of Honolulu, HI with operations beginning on September 7 and concluding on September 30. Operations will use the ship’s deep water mapping systems (Kongsberg EM302 multibeam sonar, EK60 split-beam fisheries sonar, and Knudsen 3260 chirp sub-bottom profiler sonar), NOAA’s two-body 6000 m rated remotely operated vehicle (ROVs *Deep Discoverer* and *Seirios*), CTD rosette, and the ship’s high-bandwidth satellite connection for real-time ship to shore communications. ROV dives will mostly be conducted during the day, while CTD casts, and multibeam, singlebeam, and sub-bottom acoustic mapping will occur when the ROV is on deck. Exploration operations for Leg II will focus on areas around the North West Hawaiian Islands. Dives are planned in deep-water offshore of Oahu, in and just outside of Papahānaumokuākea Marine National Monument (PMNM) and Johnston Atoll in the Pacific Remote Islands National Marine Monument. ROV dives will include high-resolution visual surveys and limited rock and biologic specimen sampling. ROV dives during this cruise will offer the first-ever look at deep seafloor habitats deeper than 400m in PRIMNM. This expedition will help establish a baseline of information in the region to catalyze further exploration, research and management activities.

NOAA Ship *Okeanos Explorer* systematically explores the ocean every day of every cruise to maximize public benefit from the ship’s unique capabilities. With 95% of the ocean unexplored, we pursue every opportunity to map, sample, explore, and survey at planned destinations as well as during transits; “Always Exploring” is a guiding principle. An integral element of *Okeanos Explorer*’s “Always Exploring” model is the ship’s seafloor and water column mapping capabilities. All three mapping sonars (EM 302, EK 60, Knudsen sub-bottom) will be operational on all transits during this expedition for 24-hour seabed, water column, and sub-bottom data collection and selected processing.

As a telepresence-enabled ROV cruise, EX-15-04 Leg IV is anticipated to have a robust complement of shore-based science experts participating from their home institutions and Exploration Command Centers around the country. This shore-based science team will actively engage with the at-sea team in real-time using *Okeanos Explorer*’s state-of-the art telepresence technology, including during ROV dives and daily ship-to-shore science planning meetings. In general, operations will focus in the areas highlighted in Figure 1.

**B. Days at Sea (DAS)**

Of the 24 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 20 DAS are funded by a NMFS Line Office Allocation, 1 DAS are funded by an OAR Line Office Allocation, 3 DAS is funded by a NOS Line Office Allocation, 0 DAS are Program Funded, and 0 DAS are other agency funded. This project is estimated to exhibit a High Operational Tempo due to daily ROV operations, nighttime mapping, and possible evening CTD work.

**C. Operating Area**

Leg IV of the CAPSTONE Expedition is a telepresence-enabled ROV cruise that will focus on sites near Johnston Atoll inside the Pacific Remote Islands National Marine Monument, and a few sites offshore of Oahu and Ni’ihau en route to and from the Monument as well as dives in Papahānaumokuākea Marine National Monument .The ship will depart Pearl Harbor, Oahu and conduct a short dive near the island then head to towards the southern border of PMNM, then transit to PRIMNM where the majority of ROV dives will be conducted. Rift zone ridges, ridge features and other types of abrupt topography will be targeted due to their likelihood of hosting extensive communities of deepwater corals and sponges, as well as likely manganese crust habitats from 1,000-2,500m. The deepest extent of important coral and sponge groups will also be explored during dives to depths of 3,000-5,000 m. The ship will then depart PRIMNM and head to back the main Hawaiian Islands before heading back into port in Pearl Harbor, Oahu to complete the cruise.

The ship will conduct 24 hour operations consisting of daytime ROV dives and evening/nighttime mapping operations including during transit. During this cruise we will conduct 8 hour ROV dives on most days with occasional 10 or 12 hour dives on particularly interesting or deep dive sites. ROV operations will focus in depths between 250 and 6,000 meters and will include high-resolution visual surveys and limited sample collection. Mapping operations will be conducted in 250m of water and deeper, and include transit and overnight multibeam, water column backscatter, and sub-bottom data collection. Opportunistic CTD rosette operations may be requested to collect more information about the environmental parameters at ROV dives sites, or opportunistically at selected sites where collecting the data is considered important to understanding the physical or chemical properties of the overlying water column. ROV and mapping operations will not be conducted in state waters. CTD rosette operations may be requested in state waters.



Figure 1: The white line is the approximate operating area of *Okeanos Explorer* for EX-15-04-Leg IV. The red lines denote the approximate locations of the EEZ boundaries. Figure produced in Google Earth Pro.



Figure 2: Approximate operating area of *Okeanos Explorer* for EX-15-04-Leg IV. The white line is the proposed ship track. The White circles are possible dive sites and the red lines denote the approximate locations of the EEZ boundaries. Figure produced in Google Earth Pro.

**D. Summary of Objectives**

**Leg IV: September 7- September 30 (Honolulu, HI to Honolulu, HI) Telepresence-enabled ROV cruise with mapping and possible CTD operations**

EX-15-04 Leg IV operations will cover a wide area of the US EEZ around Johnston Atoll and the Hawaiian Island Chain. The primary goal for this cruise is to collection baseline data and information to support priority NOAA science and management needs.

Mission objectives for EX-15-04 Leg IV include a combination of operational, science, education, outreach, and data management objectives:

1. Science
	1. Acquire data to support priority Monument and Sanctuaries science and management needs;
	2. Discover and characterize vulnerable marine habitats - particularly high density deep sea coral and sponge communities;
	3. Collect data to characterize seamounts within the Prime Crust Zone;
	4. Collect information on the geologic history of Central Pacific Seamounts, including those that are or may be relevant to our understanding of plate tectonics and subduction zone biology and geology;
	5. Refine specimen collection protocols and processing procedures (see appendix X)
	6. Ground-truth acoustic data using video imagery and characterize associated habitat
	7. Engage a broad spectrum of the scientific community and public in telepresence-based exploration
	8. Successfully conduct operations in conjunction with shore-based Exploration Command Centers and remote science team participants
	9. Create and provide input into standard science products to provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities.
2. Remote Science/Exploration Command Centers
	1. Test and facilitate remote science participation from the new Exploration Command Center at the University Hawaii, Manoa and the NOAA Inouye Regional Center (IRC).
	2. Provide operational support and training to scientists and managers to enable remote participation in at-sea operations.
	3. Facilitate outreach and engagement activities and events at the ECCs.
	4. Test and refine ship-to-shore communications procedures that engage multiple ECCs and other remote participants
	5. Test and refine operating procedures and products
3. ROV
	1. Daytime ROV dives on exploration targets
	2. Ongoing training of pilots
	3. Ongoing system familiarization, documentation, and training
	4. Test and refine new ROV systems and pilot sampling protocol
	5. Demobilize the ROV system in preparation for dry dock
4. Telepresence (VSAT 20 mb/sec ship-to-shore; 2 mb/sec shore-to-ship)
	1. Test terrestrial and high-speed satellite links
	2. Support telepresence-enabled ROV operations
	3. Collect/create all standard video products
	4. Facilitate live outreach events between ship and shore
	5. Continue to refine protocols for the new WOWZA servers at the Inner Space Center
	6. Continue to refine protocols for using YouTube live to host live video
	7. Configure new video editing workstation
	8. Formalize / Finalize parallel processing of imagery and video compression routines
	9. Work develop protocols and procedure for using the Telestream video recording suite
	10. Refine operation at the two new Exploration Command Centers – one at University of Hawaii Manoa and the other at the NOAA Inouye Regional Center on Ford Island, Honolulu, HI
	11. Work with the NASA xGDS team to improve telepresence software.
5. Mapping
	1. Collect high resolution mapping data from all three sonars in priority areas as dictated by operational needs as well as science and management community needs
	2. Support ROV operations with mapping products and expertise
	3. Conduct mapping operations during transit, with possible further development of exploration targets
	4. Collect XBT casts at regular intervals no longer than 3-4 hours, as data quality requires, during mapping operations
	5. Create daily standard mapping products
	6. Collection of sun photometer measurements as part of survey of opportunity
6. CTD operations
	1. Conduct CTD a cast for comparison to ROV CTDs after first ROV dive if needed
	2. Conduct CTDs to collect environmental data, possibly including water sample collection, as requested by the science team
7. Data Management
	1. Provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities, as detailed in the 2014 post-cruise product list
	2. Provide daily products to shore for operational decision making purposes, as detailed in the 2015 field products list (appendix X)
	3. Continue to test the ability to record high definition video footage of a full dive onboard the ship
	4. Develop and test protocols and procedures for handling the data from the Telestream video recording system.
	5. Develop and test protocols and procedures for handling data from pilot sampling efforts
	6. Train new data engineers
	7. Cross train existing ROV dedicated personnel
	8. Formalize Data Management SOPs
	9. Formalize / Finalize parallel processing of imagery and video compression routines
	10. Continue development on real time data visualization of ROV geospatial and environmental parameters
8. Outreach
	1. Engage the general public in ocean exploration through live video and timely content (daily updates, topical essays and web logs, highlight videos, video clips, still imagery and mapping products) posted on the Ocean Explorer website
	2. Host live events with VIPs
	3. More TBD

**E. Participating Institutions**

National Oceanic and Atmospheric Administration (NOAA), Office of Ocean Exploration and Research (OER)–1315 East-West Hwy, Silver Spring, MD 20910 USA

NOAA, National Oceanographic Data Center, National Coastal Data Development Center, Stennis Space Center MS, 39529 USA

NOAA, Office of Coast Survey, Hydrographic Surveys Division, Atlantic Hydrographic Branch, 439 W. York St., Bldg 2, Norfolk, VA 23510 USA

University Corporation for Atmospheric Research Joint Office for Science Support (JOSS), PO Box 3000 Boulder, CO 80307 USA

University of Hawai’i Manoa- 2500 Campus Rd, Honolulu, HI 96822

NOAA, National Ocean Service, Office of National Marine Sanctuaries, Papahānaumokuākea Marine National Monument - 1845 Wasp Blvd., Building 176, Honolulu, HI 96818

University of New Hampshire (UNH) Center for Coastal and Ocean Mapping (CCOM) Jere A. Chase Ocean Engineering Lab, 24 Colovos Rd, Durham, NH 03824 USA

University of Louisiana at Lafayette Biology Department, 300 E St. Mary Blvd., Lafayette, LA 70503 USA

**NOAA National Ocean Service, Office of National Marine Sanctuaries, Papahānaumokuākea Marine National Monument**, 1845 Wasp Blvd., Building 176, Honolulu, HI 96818

**F. Personnel (Mission Party)**

**Table 1: Leg II—Full list of sea going mission party members and their affiliations**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Name** **(Last, First)** | **Title** | **Date Aboard** | **Date Disembark** | **Gender** | **Affiliation** | **Nationality** |
| Kennedy, Brian  | Expedition Coordinator |  |  | M | NOAA OER | USA |
| Mckenna, Lindsay | Mapping Lead |  |  | F | NOAA OER(ERT Inc) | USA |
| Reser, Brendan | Data Engineer |  |  | M | NOAA NCDDC (DGIT) | USA |
| Drewniak, Jared | Video Engineer |  |  | M | NOAA OER(ERT Inc) | USA |
| France, Scott | Science Co-Lead |  |  | M | UL, Lafayette  | USA |
| Gerring, Mackenzie | Science Co-Lead |  |  | F | UH Monoa | USA |
| McLetchie, Karl | Dive Supervisor |  |  | M | UCAR | USA |
| Wright, Dave | ROV Engineer  |  |  | M | UCAR | USA |
| Williams, Jeff | ROV Engineer |  |  | M | UCAR | USA |
| Mohr, Bobby | ROV Engineer |  |  | M | UCAR | USA |
| Lanning, Jeff | ROV Engineer |  |  | M | UCAR | USA |
| Kennison, Sean | ROV Engineer |  |  | M | UCAR | USA |
| TBD | ROV Engineer |  |  |  | UCAR | USA |
| Ritter, Chris | ROV Engineer |  |  | M | UCAR | USA |
| Carlson, Joshua | ROV Engineer |  |  | M | UCAR | USA |
| Rogers, Dan | Video Engineer |  |  | M | UCAR | USA |
| Howard, Art | Video Engineer |  |  | M | UCAR | USA |
| TBD | Video Engineer |  |  |  | UCAR | USA |
| O’Brien, Andy | Data Engineer |  |  | M | UCAR | USA |
| Raymond, Annie  | Mapping Watch Lead |  |  | F | PHB | USA |

**Table 2: Leg II—Shore-based Operations Team**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Last Name** | **First Name** | **Organization** | **Area of interest or expertise.** | **Location** |
| Cantwell | Kasey | NOAA OER | Shore-side Ops and Web Coordinator  | UH Manoa/ NOAA IRC/SS |
| Pawlenko | Nikolai | NOAA Ship *Okeanos Explorer* | Shore-side Ops | UH Manoa/ NOAA IRC |
| Elliot | Kelley | NOAA OER | Shore-side Ops | Varies  |
| Martinez | Catalina | NOAA OER | Shore-side Ops | ISC |
| Potter | Jeremy | NOAA OER | Shore-side Ops | SS |
| Crum | Emily | NOAA OER (Acentia) | Communications Coordinator | Key West |
| Graddy | Sarah | NOAA OER (Acentia) | Media specialist  | SS ECC |
|  |  |  |  |  |

**Table 3: Leg II -- Shore Based Science Team**

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| **Description of Participation Levels** |
| Level 1 | "Core" team member of the interdisciplinary science team guiding science operations and providing input into a core suite of science products during a significant portion or all of the expedition.  |
| Level 2 | Focused team member participating during operations focused on areas, topics or dates of interest. |
| Level 3 | Occasional team member participating when convenient and likely unable to commit to specific dives or dates. |
| Level 4 | "Doctors-on-call" who are actively engaged only when called upon by the core science team. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Last Name** | **First Name** | **Organization** | **Area of interest or expertise.** | **What is your level of intended/desired participation?** |
| Diva | Amon | University of Hawaii | Deep-sea mining-seamounts with polymetallic nodules or ridges with cobalt crusts; Organic falls (wood and marine mammals); Hydrothermal vents/cold seeps; Litter | Level 1: Legs 2 and 4 (Latter Half)Level 3: Leg 2 |
| Jamie | Austin | UT Austin | Geology | Level 3 "Occasional" |
| Jesse | Ausubel | Rockefeller University | All | Level 3 - Occasional |
| Amy | Baco-Taylor | FSU | All | Available for all cruises. Would like to be core for some. |
| Samantha | Brooke | NOAA | Monuments | Level 1 "Core" |
| David | Clague | MBARI | Submarine Volcanism, esp. formation and degradation of oceanic volcanoes, particularly Hawaiian volcanoes, mid-ocean ridges, and isolated seamounts | Level 4 Doctor on Call |
| Erik | Cordes | Temple University | Biology. Deep Sea Corals and Seep Communities. | Level 3 Occasional |
| Melanie | Damour | BOEM | Archaeology | Level 2 - Archaeology Dives. 4 - Doctor on Call for unexpected wrecks. |
| Jim | Delgado | NOAA | Archaeology | Level 4 Doctor on Call |
| Dan | Distel | Northeastern University | Biological sampling across all taxonomic groups, locations and ecotypes. Priorities: organic falls (wood), hydrothermal vents/cold seeps, deep sea corals. | Level 2 (all biosampling) |
| Jeff | Drazen | UH | Fish | Occasional |
| Stephanie | Farrington | HBOI at FAU | Deep Sea Corals | TBD |
| Kim | Faulk | ACUA/GEMS | Archaeology | TBD. Level 3/4? |
| Mike | Ford | NOAA NMFS | Water Column; Gelatinous Zooplankton | 1. Core for Midwater work |
| Ben | Frable | Oregon State UniversityIchthyology Collection | Meso-, bathy- and bethopelagic fishes and have worked on dragonfish and lizardfish systematics | Level 2 or 3 |
| Michael | Garcia | UH | Geology & Geophysics | Level 1 and 2 except for August 8-22nd. |
| Chris | German | WHOI | Hydrothermal Vents | 3 Doctor-on-Call |
| Steve | Haddock | MBARI | Midwater | Midwater |
| Esprit | Heestand Saucier | University of Louisiana at Lafayette | Biology | TBD |
| Santiago | Herrera | University of Toronto / WHOI | Biology | Level 1 and 2 |
| Kim | Hum | The Nature Conservancy | Interest in deep water ecology and marine conservation in general region | TBD |
| Reed | John | HBOI- Florida Atantic University | Deepwater and Mesophotic Coral Ecosystems | TBD; CORE at HBOI-ECC |
| Astrid | Leitner | UH - Masters Students | Fish | TBD |
| List | Levin | UCSD, Director CMBC | Deep sea Ecology | Level 3 "Occasional" |
| Jennifer | McKinnon | ECU | Archaeology | Level 2 - Archaeology Dives |
| Margaret | McManus | UH | primarily interested in plankton video from the descents and ascents | occasional in ECC and on own |
| Tina | Molodtsova | P.P.Shirshov Institute of Oceanology | deep-sea corals, black corals, fauna of cobalt crust | Level 3 for leg 2 and 4 |
| Bruce | Mundy | NOAA NMFS Pacific Islands Fisheries Science Center | The fish fauna of the 200 nmi Exclusive Economic Zones of the U.S.-affiliated central Pacific islands | Occasional team member for the ROV surveys |
| Risa | Oram | NOAA PIFSC | Monuments Science, Fisheries, NOAA | Level 3 "Occasional" |
| Michael | Parke | NOAA NMFS | Deep Sea Corals | Rep for DSCRTP |
| Frank | Parrish | NMFS, PRD & DSCRTP | Deep Sea Corals, Fish | 1. Core, Onboard Co-Lead, NMFS Rep for EX DAS |
| Andrea | Quattrini | USGS | Deep Sea Corals, Fish | Level 2 or 3 |
| Waller | Rhian | University of Maine | Cold water coral ecosystems | Level 3 |
| Brendan | Roark | Texas A&M University, College Station | Deep Sea Corals, Ecology | Level 1-2  |
| Sonia | Rowley | UH | Deep Sea Corals | Level 3 |
| Ken | Rubin | UH | Geology - Carbonate Terraces | Level 3 "Occasional". Interested in dives during Leg 3 and possibly the drowned reef terrace at Gardner Pinnacles. |
| Carolyn | Ruppel |  USGS | Geology- hydrates |   |
| Charlotte | Seid | Northeastern University, Nahant, MA | Biological sampling across all taxonomic groups, locations and ecotypes. Priorities: organic falls (wood), hydrothermal vents/cold seeps, deep sea corals. | Level 2 (all biosampling) |
| Hans | Van Tilburg | NOAA MHP - HI Region | Archaeology | 1 for Archaeology |
| Mike | Vecchione | NOAA NMFS/ SINational Systematic Lab | Cephalopods; Water Column Transects | 2. Core for Midwater transects. Occasional for midwater work? |
| Scott | White | USC | Geology | TBD |
| Mary | Wicksten | Texas A&M University, College Station | Biology - crustaceans | TBD |
| Gary | Williams | CA Academy of Natural Sciences | Deep Sea Corals, especially octocoral cnidarians, including soft corals, (sea fans) gorgonians, and sea pens (pennatulaceans) | TBD |
| Amanda | Ziegler | UH Manor | Interested in hard substrate fauna of the deep sea and currently work on baseline studies of megafauna for the UK in their nodule claim area within the CCZ. Working with Diva Amon | Level 2 for Leg 2 (July 31-Aug 22) and Leg 4 (Sept 8 - 30) |

**G. Administrative**

## Points of Contact:

*Ship Operations*

|  |  |
| --- | --- |
| Marine Operations Center, Atlantic (MOA)439 West York StreetNorfolk, VA 23510-1145Telephone: (757) 441-6776Fax: (757) 441-6495 | Chief, Operations Division, Atlantic (MOA)LCDR Don Beaucage, NOAATelephone: (757) 441-6842E-mail: Chiefops.MOA@noaa.gov |
|  |  |

### *Mission Operations*

|  |  |
| --- | --- |
| LT Brian Kennedy, Expedition Coordinator NOAA Ocean Exploration and ResearchO: (401) 874-6150C: (401) 603-6017Brian.Kennedy@noaa.gov Lindsay McKennaMapping LeadNOAA Office of Ocean Exploration and Research (ERT)O: 603-862-5246C: 518-669-2285E-mail : lindsay.mckenna@noaa.gov Kelley ElliottExpedition ManagerNOAA Office of Ocean Exploration and Research Office: (301) 734-1024  E-mail : Kelley.Elliott@noaa.gov | CDR Mark Wetzler, NOAACommanding OfficerNOAA Ship *Okeanos Explorer*Phone: (401) 378-8284Email: CO.Explorer@noaa.govLT Emily Rose, NOAAOperations OfficerNOAA Ship *Okeanos Explorer*Phone: (808) 659-9197 (Ship’s Iridium)E-mail: Ops.Explorer@noaa.govDave LovalvoEngineering Group LeadNOAA Office of Ocean Exploration and Research (ERT)Phone : (401) 874-6150/ (706) 540-2664E-mail :david.lovalvo@noaa.gov |

***Other Mission Contacts***

|  |  |
| --- | --- |
| John McDonough, Deputy DirectorNOAA Ocean Exploration & ResearchPhone: (301) 734-1023 / (240) 676-5206E-mail: John.McDonough@noaa.gov |  |

**Vessel shipping address:**

*Shipments:*

Send an email to the *Okeanos Explorer* Operations Officer at OPS.Explorer@noaa.gov indicating the size and number of items being shipped.

Items sent to Honolulu should arrive at the below address prior to **COB July 28, 2015**.

LT Emily Rose

NOAA Ship Okeanos Explorer

1897 Ranger Loop

Ford Island Bldg. 184

Honolulu, HI 96818

1. Diplomatic Clearances

None Required.
2. Licenses and Permits

This project will be conducted under the Scientific Research Permit PMNM-2015-018 issued to Ms. Kelley Elliott to conduct work in the Papahanoumokuakea Marine National Monument (PMNM). The permit was issued by the Co-Trustees of the PMNM Board effective July 1, 2015 and expiring June 30, 2016. (Appendix X)

OER has also completed an informal consultation with NOAA’s National Marine Fisheries Service (NMFS) under section 7 of the Endangered Species Act of 1973 that address the potential impacts of project activities to ESA-listed species and critical habitat within the project operating area. A Letter of Concurrence was received from NMFS on July 7, 2015, concurring with OER’s determination that EX-15-04 cruise 1-4 activities are not likely to adversely affect ESA-listed marine species, and would have insignificant effects on designated or proposed critical habitat (Appendix X).

1. **OPERATIONS**

The Expedition Coordinator is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives, priorities and environmental compliance procedures. The Commanding Officer is responsible for ensuring all operations conform to the ship’s accepted practices and procedures.

1. **Project Itinerary** *(All times and dates are subject to prevailing conditions and the discretion of the Commanding Officer)*

We will conduct primarily 8 hour ROV dives, and operate on Hawaii time. CTD casts are expected and requested, but will be TBD based on the availability of ship personnel and operational constraints.

**Table 3: Leg II Detailed Itinerary**

*This is an approximate itinerary and is subject to change*

|  |  |  |
| --- | --- | --- |
| **Date** | **Activity**  | **Notes and Requirements** |
| 9/5/2015 | Crew Rest. New mission personnel will start arriving.  | Crew Rest |
| 9/6/2015 | Crew Rest. The remaining mission personnel arrive | Train new mission personnel and crew rest |
| 9/7/2015 | Dive 1 Demonstration dive | Dive 1 will be on the S-19 Submarine and we will have additional personnel on board the he demonstation dive. Small boat transfer following the ROV dive.  |
| 9/8/2015 | Dive 2 | Normal ROV Dive |
| 9/9/2015 | Dive 3 | Normal ROV Dive |
| 9/10/2015 | Dive 4 | Normal ROV Dive |
| 9/11/2015 | Transit  | Transit to Johnston Atoll area |
| 9/12/2015 | Dive 5  | Normal ROV Dive |
| 9/13/2015 | Dive 6 | Normal ROV Dive |
| 9/14/2015 | Dive 7 | Normal ROV Dive |
| 9/15/2015 | Dive 8 | Normal ROV Dive |
| 9/16/2015 | Dive 9 | Normal ROV Dive |
| 9/17/2015 | Dive 10 | Normal ROV Dive |
| 9/18/2015 | Dive 11 | Normal ROV Dive |
| 9/19/2015 | Dive 12 | Normal ROV Dive |
| 9/20/2015 | Dive 13 | Normal ROV Dive |
| 9/21/2015 | Dive 14 | Normal ROV Dive |
| 9/22/2015 | Dive 15 | Normal ROV Dive |
| 9/23/2015 | Dive 16 | Normal ROV Dive |
| 9/24/2015 | Dive 17 | Normal ROV Dive |
| 9/25/2015 | Dive 18 | Normal ROV Dive |
| 9/26/2015 | Dive 19 | Normal ROV Dive |
| 9/27/2015 | Dive 20 | Normal ROV Dive |
| 9/28/2015 | Transit  | Transit to the Hawaiian Islands |
| 9/29/2015 | Dive 21 | Demonstration day trip. Pick up VIPs either alongside or small boat transfer then conduct an ROV dive then return them to shore |
| 9/30/2015 | Arrival Honolulu | Arrival. Secure ROVs for transit to the Pacific. Crane support will be required to clear the fantail in preparation for buoy operations on EX1503L2 |
| 10/1/2015 | Demob |   |
| 10/2/2015 | Demob, Mission personnel start to depart |   |
| 10/3/2015 | Demob, Final Mission personnel depart |   |

1. **Staging and Destaging**
	1. All staging operations will be completed on the prior leg.
	2. The ROV will be completely demobilized at the end of leg IV to prepare for the ship heading to dry dock.
2. **Operations to be Conducted**

**Telepresence Events**

* 1. Dates TBD- there will be additional live events that come up as the cruise progresses. These events will have little to no effect on the ship’s operations and will be raised during daily operations briefings.

**In-Port Events**

* 1. On September 7th we will bring guests on board for a short ROV demonstration dive. At the conclusion of the dive they will be transferred back ashore by small boat.
1. **SCUBA Dive Plan**

All dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program (<http://www.ndc.noaa.gov/dr.html>) and require the approval of the ship’s Commanding Officer. No SCUBA dives are currently planned for this cruise.

1. **Applicable Restrictions**

**Sonar Operations**

EM 302, EK 60, and sub-bottom profiler data acquisition is planned for this cruise. All data acquisition will be conducted in accordance with established standard operating procedures under the direction of the mapping team lead. These operating procedures will include protection measures when operating in the vicinity of marine mammals, sea turtles or Endangered Species Act-listed species as described in Appendixces X and X. The final decision to operate and collect 24-hour sub-bottom profiler data will be at the discretion of the Commanding Officer.

1. **EQUIPMENT**
2. **Equipment and capabilities provided by the ship**
* Kongsberg Simrad EM302 MultibeamEchosounder (MBES)
* Kongsberg Simrad EK60DeepwaterEchosounder
* Knudsen Chirp 3260 Sub-bottom profiler (SBP)
* LHM Sippican XBT (Deep Blue probes)
* Seabird SBE 911Plus CTD
* Seabird SBE 32 Carousel and 24 2.5 L Niskin Bottles
* Light Scattering Sensor (LSS)
* Oxidation – Reduction Potential (ORP)
* Dissolved Oxygen (DO) sensor
* Altimeter Sensor and battery pack
* CNAV GPS
* POS/MV
* Seabird SBE-45 (Micro TSG)
* Kongsberg Dynamic Positioning-1 System
* NetApps mapping storage system
* CARIS HIPS Software
* IVS Fledermaus Software
* SIS Software
* Hypack Software
* Scientific Computing System (SCS)
* ECDIS
* Met/Wx Sensor Package
* Telepresence System
* VSAT High-Speed link (Comtech 20 Mbps ship to shore; 2 Mbps shore to ship)
* Cruise Information Management System (CIMS)
* Three VoIP telephone lines
* NOAA OER 6000 m *Deep Discoverer* ROV
* NOAA *Seirios* Camera Platform
1. **Equipment and capabilities provided by the scientists**
* Microtops II Ozone Monitor Sunphotometer and handheld GPS required for NASA Marine Aerosols Network supplementary project.
* Equipment associated with new sampling protocol (See Appendix D)
1. **HAZARDOUS MATERIALS**
2. Policy and Compliance

The Expedition Coordinator is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). The Expedition Coordinator and Science Team Lead will be responsible for transporting all samples and HAZMAT on and off the ship. By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

* + - List of chemicals by name with anticipated quantity
		- List of spill response materials, including neutralizing agents, buffers, and absorbents
		- Chemical safety and spill response procedures, such as excerpts of the program’s Chemical Hygiene Plan or SOPs relevant for shipboard laboratories
		- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship’s Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

* An inventory list showing actual amount of hazardous material brought aboard
* An MSDS for each material
* Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program
* Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO’s designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship’s complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of hazardous materials is not permitted aboard NOAA ships.

1. Inventory

|  |  |  |
| --- | --- | --- |
| Item | Use | Approx. locations |
| 95% Denatured Ethanol (10 gallons) | Sample preservation | Wetlab, under the chemical hood |
| 10% Buffered Formalin (3 gallons) | Sample preservation | Wetlab, under the chemical hood |
| Chaos Buffer (0.5 gallons)(4 M guanidine thiocyanate, 0.5% N-laurosyl sarcosine, 25 mM Tris pH 8.0, 0.1 M beta-mercaptoethanol) | Sample preservation (genetics) | Wetlab, under the chemical hood |
| Aqua Shield | Underwater Lubricant | ROV Workshop Fire Cabinet, Pit |
| Dow Corning 4 | Electrical insulating compound | ROV Workshop Fire Cabinet, Pit |
| Fluid Film Spray | Silicone Lubricant | ROV Workshop Fire Cabinet |
| Isopropanol Alcohol | Solvent | ROV Workshop Fire cabinet |
| Scotchkote | Electrical insulating compound | ROV Workshop Fire cabinet |
| 3M Silicone Spray | Silicone Lubricant | ROV Workshop Fire cabinet |
| Synthetic AW Hydraulic Oil, ISO-22 | Amsoil (AWG-05) | Hanger, Pit, Vehicles |
| Tap Magic Cutting Fluid | Cutting/Machining Lubricant | ROV Workshop Fire cabinet |
| Tap Magic Heavyweight Cutting Fluid | Cutting/Machining Lubricant | ROV Workshop Fire cabinet |
| Tuff Coat M | Marine Lubricant | ROV Workshop Fire cabinet |
| Dow Corning Molykote 111 | Valve Lubricant and Sealant | ROV Workshop Fire cabinet, Pit |
| WD40 | Lubricant | ROV Workshop Fire cabinet |
| Loktite | Bolt adhesive | ROV Workshop Fire cabinet |
| Mineral Oil | Vitrea | Hanger, Vehicles |
| Por-15 | Paint Kit | ROV Workshop Fire cabinet |
| Univis HVI 13 | Hydraulic Fluid | Hanger, ROV D2 |
| Ultratane | Butane fuel | ROV Workshop fire cabinet |
| Rust-oleum | Protective Enamel | ROV Workshop fire cabinet |
| Flux-Off | Soldering Flux remover | ROV Workshop fire cabinet |
| Propane | Torch Fuel | ROV Workshop fire cabinet |

1. Chemical safety and spill response procedures
	1. All safety and spill response procedures will be handled according to OMAO guidelines and following the manufacturers MSDS which has been provided to the ship’s ECO.
2. Radioactive Materials
*NOT APPLICABLE TO THIS CRUISE*
3. **ADDITIONAL PROJECTS**
4. **Supplementary Projects**

*NASA Maritime Aerosol Network*

During the cruise the marine aerosol layer observations will be collected for the NASA Maritime Aerosol Network (MAN). Observations will be made by mission personnel (mapping interns) with a sun photometer instrument provided by the NASA MAN program. Resulting data will be delivered to the NASA MAN primary investigator Alexander Smirnov by the expedition coordinator. All collected data will be archived and publically available at: <http://aeronet.gsfc.nasa.gov/new_web/maritime_aerosol_network.html>

Equipment resides on the ship and is stewarded by the Expedition Coordinator.

See Appendix D for full Survey of Opportunity Form.

1. **NOAA Fleet Ancillary Projects**

No NOAA Fleet Ancillary Projects are planned.

1. **DISPOSITION OF DATA AND REPORTS**
2. **Data Responsibilities**

All data acquired on *Okeanos Explorer* will be provided to the public archives without proprietary rights. **All data management activities shall be executed in accordance with NAO 212-15, Management of Environmental and Geospatial Data and Information**

[<http://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_212/212-15.html>].

##### Ship Responsibilities

The Commanding Officer is responsible for all data collected for missions until those data have been transferred to mission party designees. Data transfers will be documented on NOAA Form 61-29. Reporting and sending copies of project data to NESDIS (ROSCOP form) is the responsibility of OER.

##### NOAA OER Responsibilities

#### The Expedition Coordinator will work with the *Okeanos Explorer* Operations Officer to ensure data pipeline protocols are followed for final archive of all data acquired on *Okeanos Explorer*without proprietary rights. See Appendix B for detailed data management plans.

#### *Deliverables*

* 1. At sea
		+ - Daily plans of the Day (POD)
			- Daily situation reports (SITREPS)
			- Daily summary bathymetry data files
			- Summary forms for each ROV dive
			- Summary forms for each sample collection
			- Summary forms for each CTD rosette cast
	2. Post cruise
		+ - Refined SOPs for all pertinent operational activities
			- Assessments of all activities
	3. Science
* Multibeam and XBT raw and processed data (see appendix B for the formal cruise data management plan)
* EK 60 raw data
* Knudsen 3260 sub-bottom profiler raw data
* Mapping data report
* Cruise Report

#### *Archive*

* OER and ship will work together to ensure documentation and stewardship of acquired data sets in accordance with NAO 212-15. The Cruise Information Management System is the primary tool used to accomplish this activity.
1. **Meetings, Vessel Familiarization, and Project Evaluations**

Shipboard Meetings

A safety brief and overview of POD will occur on the Bridge each morning at 0800. Daily Operations Briefing meetings will be held at 1330 in the forward lounge to review the current day, and define operations, associated requirements, and staffing needs for the following day. A Plan of the Day (POD) will be posted each evening for the next day in specified locations throughout the ship. Daily Situation Reports (SITREPS) will be posted as well and shared daily through e-mail and/or the EX FTP site.

1. Pre-Project Meeting: The Expedition Coordinator and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship’s crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship’s Operations Officer usually is delegated to assist the Expedition Coordinator in arranging this meeting.
2. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project’s start and is normally presented by the ship’s Operations Officer.
3. Post-Project Meeting: The Commanding Officer is responsible for conducting a meeting no earlier than 24 hrs before or seven days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship’s officers, applicable crew, the Expedition Coordinator, and members of the scientific party and is normally arranged by the Operations Officer and Expedition Coordinator.
4. Project Evaluation Report:

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Expedition Coordinator. The form is available at <http://www.omao.noaa.gov/fleeteval.html> and provides a “Submit” button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

1. **MISCELLANEOUS**
2. **Meals and Berthing**

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship’s command at least twenty-one days prior to the survey (e.g., Expedition Coordinator is allergic to fin fish).

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Expedition Coordinator. The Expedition Coordinator and Operations Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship’s complement. The Expedition Coordinator is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Expedition Coordinator is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the cruise and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Expedition Coordinator will ensure that all non-NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the Expedition Coordinator to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 7, 1999 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

1. **Medical Forms and Emergency Contacts**

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Expedition Coordinator or the NOAA website <http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf>.

All NHSQs submitted after March 1, 2014 must be accompanied by [NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document](http://www.moc.noaa.gov/all-ships/NOAA%20Form%2057-10-02%20%281-14%29%20Tuberculosis%20Screening%20Document.pdf) in compliance with OMAO Policy 1008 (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than four weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (<http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240>).

The only secure email process approved by NOAA is Accellion Secure File Transfer which requires the sender to setup an account. Accellion’s Web Users Guide is a valuable aid in using this service, however to reduce cost the DOC contract doesn’t provide for automatically issuing full functioning accounts. To receive access to a “Send Tab,” after your Accellion account has been established send an email from the associated email account to accellionAlerts@doc.gov requesting access to the “Send Tab” function. They will notify you via email, usually within one business day of your approval. The “Send Tab” function will be accessible for 30 days.

Contact information:

Regional Director of Health Services
Marine Operations Center – Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone (757) 441.6320
Fax (757) 441.3760
E-mail: MOA.Health.Services@noaa.gov

Please make sure the medical.explorer@noaa.gov email address is cc’d on all medical correspondence.

Prior to departure, the Expedition Coordinator must provide a listing of emergency contacts to the Operations Officer for all members of the scientific party, with the following information: name, address, relationship to member, and telephone number.

Emergency contact form is included as Appendix A.

1. **Shipboard Safety**

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. Hard hats are also required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Operational Risk Management: For every operation to be conducted aboard the ship (NOAA-wide initiative), risk management procedures will be followed. For each operation, risks will be identified and assessed for probability and severity. Risk mitigation strategies/measures will be investigated and implemented where possible. After mitigation, the residual risk will have to be assessed to make Go-No Go decisions for the operations. Particularly with new operations, risk assessment will be ongoing and updated as necessary. This does not only apply to over-the-side operations, but to everyday tasks aboard the vessel that pose risk to personnel and property.

* CTD, ROV (and other pertinent) ORM documents will be followed by all personnel working onboard *Okeanos Explorer*.
* All personnel onboard are in the position of calling a halt to operations/activities in the event of a safety concern.
1. **Communications**

A daily situation report (SITREP) on operations prepared by the Expedition Coordinator will be relayed to the program office. Sometimes it is necessary for the Expedition Coordinator to communicate with another vessel, aircraft, or shore facility. Through various modes of communication, the ship is able to maintain contact with the Marine Operations Center on an as needed basis. These methods will be made available to the Expedition Coordinator upon request, in order to conduct official business. The ship’s primary means of communication with the Marine Operations Center is via e-mail and the Very Small Aperture Terminal (VSAT) link. VSAT bandwidth at 20Mbps will be provided by OER.

Specific information on how to contact NOAA Ship *Okeanos Explorer* and all other fleet vessels can be found at <http://www.moc.noaa.gov/MOC/phone.html#EX>

**Important Telephone and Facsimile Numbers and E-mail Addresses**

#### Ocean Exploration and Research (OER):

OER Program Administration:

Phone: (301) 734-1010

Fax: (301) 713-4252

E-mail: Firstname.Lastname@noaa.gov

#### University of New Hampshire, Center for Coastal and Ocean Mapping

Phone: (603) 862-3438

Fax: (603) 862-0839

#### NOAA Ship *Okeanos Explorer* - Telephone methods listed in order of increasing expense:

*Okeanos Explorer* Cellular: (401) 713-4114

*Okeanos Explorer* Iridium:(808) 659-9179

OER Mission Iridium (dry lab): (808) 851-3827

EX INMARSAT B

Line 1: 011-870-764-852-328

Line 2: 011-870-764-852-329

 Voice Over IP (VoIP) Phone:

541-867-8932
541-867-8933
541-867-8934

E-Mail: Ops.Explorer@noaa.gov - (mention the person’s name in SUBJECT field)

expeditioncoordinator.explorer@noaa.gov For dissemination of all hands emails by Expedition Coordinator while onboard. See ET for password.

1. **IT Security**
2. Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to: Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
3. Installation of the latest critical operating system security patches.
4. No external public Internet Service Provider (ISP) connections.

Completion of these requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA’s IT Security Awareness Course within three days of embarking.

1. **Foreign National Guests Access to OMAO Facilities and Platforms**

OER requests access for one Foreign National Guest, Daniel Wagner, for this project. Daniel Wagner is a representative from Papahānaumokuākea Marine National Monument and will serve as one of the two onboard Science Team Leads. James Miller, Mapping Watch Stander from NOAA Office of Coast Survey, will serve as the Foreign National Guest Host for the duration of Daniel’s stay. The required Foreign National Guest Paperwork has been submitted and Daniel has been cleared to sail. The Expedition Coordinator will provide copies of the paperwork and documentation of clearance to the Operations Officer.

**Appendix A**

**EMERGENCY CONTACT DATA SHEET**

#### NOAA OKEANOS EXPLORER

#### Scientists sailing aboard the *Okeanos Explorer* should fill out the form found at the following link location: <https://docs.google.com/a/noaa.gov/forms/d/1pcoSgPluUVxaY64CM1hJ75l1iIYirTk48G-lv37Am_k/viewform>with their emergency contact information

**Appendix B:**

**DMP**

**Appendix C: Categorical Exclusion**

**Appendix D: Permit to conduct research activities in Papahanaumokuakea Marine National Monument**

**Appendix E: ESA Section 7 Initiation Letter, Biological Evaluation and Letter of Concurrence**

**Appendix F: NASA Maritime Aerosols Network Survey of Opportunity**

**Survey or Project Name**

|  |
| --- |
| **Maritime Aerosol Network** |

**Points of Contact (POC)**

|  |  |
| --- | --- |
| *Lead POC or Principle Investigator (PI & Affiliation)* | *Supporting Team Members ashore* |
| **POC: Dr. Alexander Smirnov** | *Supporting Team Members aboard (if required)* |

**Activities Description(s)***(Include goals, objectives and tasks)*

|  |
| --- |
| **The Maritime Aerosol Network (MAN) component of AERONET provides ship-borne aerosol optical depth measurements from the Microtops II sun photometers. These data provide an alternative to observations from islands as well as establish validation points for satellite and aerosol transport models. Since 2004, these instruments have been deployed periodically on ships of opportunity and research vessels to monitor aerosol properties over the World Oceans.** |

**Appendix E: 2015 Pilot Sampling Protocol**